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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/903,764	07/13/2001	Taizo Oku		1463
30132	7590	12/23/2003	EXAMINER	
GEORGE A. LOUD 3137 MOUNT VERNON AVENUE ALEXANDRIA, VA 22305			NGUYEN, KHIEM D	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 12/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

### Office Action Summary

Application No.

09/903,764

Applicant(s)

OKU ET AL.

Examiner

Khiem D Nguyen

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 8-20 is/are pending in the application.
- 4a) Of the above claim(s) 9-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8, 19 and 20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 12, 15.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/17/2003 has been entered. A new rejection is made as set forth in this Office Action. Claims (1-5, and 8-20) are pending in the application (claims 9-18 are withdrawn).

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3-5, 8, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Takeda et al. (U.S. Pub. 2003/0111730).

In re claims 1 and 19, **Takeda** discloses a film forming method for forming a silicon-containing barrier insulating film on a substrate comprising the steps of: (a) preparing a film-forming gas comprising, (1) at least one member selected from the group consisting of alkoxy compounds having Si-H bonds and siloxane compounds having Si-H bonds (page 3, paragraphs [0019] and [0044]) and (2) at least one oxygen-containing gas

selected from the group consisting of O<sub>2</sub>, N<sub>2</sub>O, NO<sub>2</sub>, CO, CO<sub>2</sub>, and H<sub>2</sub>O; (b) converting the film-forming gas into a plasma; (c) contacting the substrate with the plasma to form the silicon-containing barrier insulating film (P-TMS) (**FIG. 6(c): 206**) on the substrate (**FIG. 6(c): 100**) (page 6, paragraphs [0059]-[0062] and **FIGS. 1-17**); and (d) forming a porous insulating film (**FIG. 6(c): 207**) by plasma enhanced CVD as an interlayer insulating film directly on the barrier insulating film (page 7, paragraph [0067]).

In re claim 3, **Takeda** discloses wherein (1) is trimethoxysilane (page 7, paragraph [0074]).

In re claim 4, **Takeda** discloses wherein (1) is tetraethoxysilane (page 4, paragraph 0045)).

In re claim 5, **Takeda** discloses wherein parallel-plate type electrodes are employed as a plasma generating means, and wherein high frequency power having a frequency of 380 kHz is applied to an electrode on which the substrate is loaded and high frequency power having a frequency of 13.56 MHz is applied to an electrode opposing the electrode on which the substrate is loaded (page 4, paragraph [0043]).

In re claim 8, **Takeda** discloses wherein the interlayer insulating film (**FIG. 6(c): 207**) (having a thickness of 325 nm) has a greater thickness than the barrier insulating layer (having a thickness of 50 nm) (**FIG. 6(c): 206**) (page 6, paragraph [0060]).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeda et al. (U.S. Pub. 2003/0111730) as applied to claims 1, 3-5, 8, and 19 above, and further in view of Saito et al. (JP 08-236518).

In re claim 2, Takeda does not explicitly disclose wherein at least one member selected from a group consisting of N<sub>2</sub> is added to the film-forming gas, Saito teaches using nitrogen as an alternative carrier gas for TMS (paragraph [0009]). It would have been obvious to one of ordinary skill in the art of making semiconductor devices to combine the teaching of Takeda and Saito to enable the use of nitrogen as a carrier gas and furthermore to obtain a semiconductor device having a high density and high reliability multilayer wiring at low cost (Abstract).

In re claim 20, neither Takeda nor Saito explicitly discloses the N<sub>2</sub>O/TMS volumetric ratio as claimed. However, there is no evidence indicating the N<sub>2</sub>O/TMS volumetric ratio is critical and it has been held that it is not inventive to discover the optimum or workable range of a result-effective variable within given prior art conditions by routine experimentation. See MPEP § 2144.05. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is to be based upon particular chosen

dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

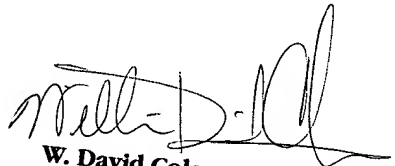
***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (703) 306-0210. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

K.N.  
December 19, 2003

  
**W. David Coleman**  
**Primary Examiner**